SEQUENCE LISTING

<110> Novozymes A/S

<120> A cell with improved secretion mediated by MrgA protein or
       homologue

<130> 10527.204-WO

<160> 16

<170> PatentIn version 3.2

<210> 1
<211> 815
<212> DNA
<213> Bacillus subtilis 168

<220>
<221> misc_feature
<222> (201)..(659)
<223> MrgA encoding sequence

<400> 1
aagaatttgc gataccgat cggaaagggc atcaagctca ccctgctgtt ccgatcgctt   60

tttccttggt ctgcgtggga gtctatcctg aagaaaaagc tattcagctg atctaaatta   120

taattattat aatttagtat tgattttat ttagtatatg atataattaa gtcaacagat   180

cacaaggagg acgttatctt atgaaaactg aaaacgcaaa aacaaatcaa acattagttg   240

agaattcact gaacacacaa ttatcaaact ggtttctttt atactctaag ctccaccgtt   300

tccattggta tgtgaaaggg cctcatttct ttacattgca cgagaaattt gaagaacttt   360

atgaccatgc ggctgaaaca gtggatacca tcgctgagcg cctgctggcg attggcggac   420

agcctgttgc cacagtgaaa gaatacactg agcatgcatc tatcacagac ggcggaaacg   480

aaacatcagc atcagaaatg gtacaagcat tggtaaacga ctacaaacaa atcagcagcg   540

aatctaaatt cgtgatcggc ctggctgaag aaaatcaaga caatgcgaca gcggacttgt   600

ttgtcggatt aattgaagaa gttgaaaaac aagtgtggat gctttcctct tatttagggt   660

aacaaaaaag ctgaacctta atcgggttca gcttttttgtt ttttcttagc ttgaactgct   720

ttctgtctgc ttggtcagtg ttgcgttcaa cgttttcgtt tttcccttc gcagcacttg   780

gattgttgtt ttatctccga ctttttaagtc tttgt   815

<210> 2
<211> 153
<212> PRT
<213> Bacillus subtilis 168

<220>

<221>   PEPTIDE
<222>   (1)..(153)
<223>   MrgA protein

<400>   2

Met Lys Thr Glu Asn Ala Lys Thr Asn Gln Thr Leu Val Glu Asn Ser
1   5   10   15

Leu Asn Thr Gln Leu Ser Asn Trp Phe Leu Leu Tyr Ser Lys Leu His
            20   25   30

Arg Phe His Trp Tyr Val Lys Gly Pro His Phe Phe Thr Leu His Glu
            35   40   45

Lys Phe Glu Glu Leu Tyr Asp His Ala Ala Glu Thr Val Asp Thr Ile
        50   55   60

Ala Glu Arg Leu Leu Ala Ile Gly Gly Gln Pro Val Ala Thr Val Lys
65   70   75   80

Glu Tyr Thr Glu His Ala Ser Ile Thr Asp Gly Gly Asn Glu Thr Ser
                85   90   95

Ala Ser Glu Met Val Gln Ala Leu Val Asn Asp Tyr Lys Gln Ile Ser
                100   105   110

Ser Glu Ser Lys Phe Val Ile Gly Leu Ala Glu Glu Asn Gln Asp Asn
            115   120   125

Ala Thr Ala Asp Leu Phe Val Gly Leu Ile Glu Glu Val Glu Lys Gln
        130   135   140

Val Trp Met Leu Ser Ser Tyr Leu Gly
145   150

<210>   3
<211>   8644
<212>   DNA
<213>   Artificial sequence

<220>
<223>   Plasmid pDG268neo

<400>   3
aacaaaattc tccagtcttc acatcggttt gaaaggagga agcggaagaa tgaagtaaga   60

gggatttttg actccgaagt aagtcttcaa aaaatcaaat aaggagtgtc aagaatgttt   120

gcaaaacgat tcaaaacctc tttactgccg ttattcgctg gattttttatt gctgtttcat   180

```
ttggttctgg caggaccggc ggctgcgagt gctgaaacgg cgaacaaatc gaatgagctt    240

acagcaccgt cgatcaaaag cggaaccatt cttcatgcat ggaattggtc gttcaatacg    300

ttaaaacaca atatgaagga tattcatgat gcaggatata cagccattca gacatctccg    360

attaaccaag taaggaagg gaatcaagga gataaaagca tgtcgaactg gtactggctg      420

tatcagccga catcgtatca aattggcaac cgttacttag gtactgaaca agaatttaaa    480

gaaatgtgtg cagccgctga agaatatggc ataaaggtca ttgttgacgc gcggccgcgg    540

atccatacac aaaaaaacgc tgtgcccttt aaccgcacag cgttttttta ttgattaacg    600

cgttgccgct tctgcgttaa caagtccgct tccatacaag ttcgtgcttc ctaaactagt    660

tgccgtattc tttagatgat ttcgaatttg tacattagac caagatgggt tcttttgttt    720

aacaagggcg gccgcacctg caacatgagg agtagccatc gatgtaccgt ttaagctggc    780

atatgttgaa cctgggtatg tgctctgcac gtttaccccg ggtgcgacaa tgtcaaggcc    840

tgcgccatac tgtgaaaagc tagcgcggtt gttgttttga tcagtagctc cgactgccat    900

tgcgttcgca tagcgcgccg gatagctgat tgagcctgca cctgaattcc cagatgccgc    960

tacaacaaga acgcctctag aagtcgcgct attaacagct tgctcgagtg tggcacttgg   1020

cgaagggctt cctaaactca aattagcaac gtgcatgcca ttgttccctg cccattccaa   1080

tccttgggca atcgagctga ccgaacctga accgctcgcc cctaggactt aacagcgta    1140

tagctcagcg ctcggcgcta cgccaagaac gccaatcgaa ttgtttaaag cagcgatcgt   1200

cccggccaca tgcgtgccat gcccattccc atcttgagtc gacggttccc ctggtacaaa   1260

gcttgcgcca ccacgaatat ttagatctgg atgagtggat atccctgtat cgaggacagc   1320

aactttaca ccagaacctg tcaatccacg gttatgggca ctggggctt gcacacggct    1380

aattccccat ggtaccgatt gcgccattgt cgttacttct gcatcctctt caatataaga   1440

aatcgctgga tcgagttcaa gcgcgtccac atcttctggg cttaactcaa cggataaaac   1500

aggaatcgtt tcaaattcat gaagcaattc aatttcgact tcctcttcct cagagagaat   1560

ggcgacctcg tcatttgcct ctacttgttc tacaaactca ctgacagctt cctgctcatt   1620

aaagccaatt aaatattttt cttttgcttc ttcagcagcc gatgcgatcg atgaactaaa   1680

agcaacagaa atgagtagtg cggtgcttgc gacaattttc cccaacggtt tcttcattcg   1740

gtttccctcc tcatttttat agagctccat aatacataat tttcaaactg ataaaatgat   1800

ttttcataaa tccattagac ggtgcaaata tatgttttta atgttcttcg tttttaggca   1860

tccctccttt caagataaat aatttataca ctattctatt ggaatcttaa tcattccaat   1920

agaaaaatat gtaatgatta taaataagtc gcttcttatc ataaatatat ttacatattc   1980

atttaatact acatcatgtt aggtatagta aggctatcaa gggtgtctta atttctactt   2040
```

```
gtaacaatgt attggcatat tatatattga attgagaaaa ttaaatacag cgataattca    2100

catgaacaag ttcattggta gttatatttt caaattttca aggttgtgct tgtatgtcat    2160

tctatagtta gataagcatt tgaggtagag tccgtccgaa tatatttgta atctgaagaa    2220

ggttcaaaca tatttctata taacgtattc ttttttttgta gttcttactt ttgaggggcg    2280

ttacaattca aagatattat ctttaattaa gcttaacatt aataattctt caattgcaac    2340

aaaaaaagca cttttatcta aggtttcatc ttacgtttcg agggcccctc cattttctta    2400

tacaaattat attatacata tcagtaaaat aatgtcaacc cccctttatt cctttttttt    2460

acacagcgga cagtctggac agcaggccct taaggccaat tctcatgttt gacagcttat    2520

catcggcaat agttaccctt attatcaaga taagaaagaa aggattttt cgctacgctc    2580

aaatccttta aaaaaacaca aagaccaca ttttttaatg tggtctttat tcttcaacta    2640

aagcacccat tagttcaaca aacgaaaatt ggataaagtg ggatatttt aaaatatata    2700

tttatgttac agtaatattg actttaaaa aaggattgat tctaatgaag aaagcagaca    2760

agtaagcctc ctaaattcac tttagataaa aatttaggag gcatatcaaa tgaactttaa    2820

taaaattgat ttagacaatt ggaagagaaa agagatattt aatcattatt tgaaccaaca    2880

aacgactttt agtataacca cagaaattga tattagtgtt ttataccgaa acataaaaca    2940

agaaggatat aaattttacc ctgcatttat tttcttagtg acaagggtga taaactcaaa    3000

tacagctttt agaactggtt acaatagcga cggagagtta ggttattggg ataagttaga    3060

gccacttat acaatttttg atggtgtatc taaaacattc tctggtattt ggactcctgt    3120

aaagaatgac ttcaaagagt tttatgattt atacctttct gatgtagaga aatataatgg    3180

ttcggggaaa ttgtttccca aaacacctat acctgaaaat gctttttctc tttctattat    3240

tccatggact tcatttactg ggtttaactt aaatatcaat aataatagta attaccttct    3300

acccattatt acagcaggaa aattcattaa taaaggtaat tcaatatatt taccgctatc    3360

tttacaggta catcattctg tttgtgatgg ttatcatgca ggattgttta tgaactctat    3420

tcaggaattg tcagataggc ctaatgactg ctttttataa tatgagataa tgccgactgt    3480

acttttttaca gtcggttttc taatgtcact aacctgcccc gttagttgaa gaaggttttt    3540

atattacagc tccagatcct ctacgccgga cgcatcgtgg ccggcatcac cggcgccaca    3600

ggtgcggttg ctggcgccta tatcgccgac atcaccgatg gggaagatcg ggctcgccac    3660

ttcgggctca tgagcgcttg tttcggcgtg ggtatggtgg caggccccgt ggccggggga    3720

ctgttgggcg ccatctcctt gcatgcacca ttccttgcgg cggcggtgct caacggcctc    3780

aacctactac tgggctgctt cctaatgcag gagtcgcata agggagagcg tcgacatgga    3840
```

```
tgagcgatga tgatatccgt ttaggctggg cggtgatagc ttctcgttca ggcagtacgc   3900

ctctttctt ttccagacct gagggaggcg gaaatggtgt gaggttcccg gggaaaagcc   3960

aaataggcga tcgcgggagt gctttatttg aagatcaggc tatcactgcg gtcaatagat   4020

ttcacaatgt gatggctgga cagcctgagg aactctcgaa cccgaatgga aacaaccaga   4080

tatttatgaa tcagcgcggc tcacatggcg ttgtgctggc aaatgcaggt tcatcctctg   4140

tctctatcaa tacggcaaca aaattgcctg atggcaggta tgacaataaa gctggagcgg   4200

gttcatttca agtgaacgat ggtaaactga caggcacgat caatgccagg tctgtagctg   4260

tgctttatcc tgatgatatt gcaaaagcgc ctcatgtttt ccttgagaat tacaaaacag   4320

gtgtaacaca ttctttcaat gatcaactga cgattacctt gcgtgcagat gcgaatacaa   4380

caaaagccgt ttatcaaatc aataatggac cagacgacag gcgtttaagg atggagatca   4440

attcacaatc ggaaaaggag atccaatttg gcaaaacata caccatcatg ttaaaaggaa   4500

cgaacagtga tggtgtaacg aggaccgaga aatacagttt tgttaaaaga gatccagcgt   4560

cggccaaaac catcggctat caaaatccga atcattggag ccaggtaaat gcttatatct   4620

ataaacatga tgggagccga gtaattgaat tgaccggatc ttggcctgga aaaccaatga   4680

ctaaaaatgc agacggaatt tacacgctga cgctgcctgc ggacacggat acaaccaacg   4740

caaaagtgat ttttaataat ggcagcgccc aagtgcccgg tcagaatcag cctggctttg   4800

attacgtgct aaatggttta tataatgact cgggcttaag cggttctctt ccccattgag   4860

ggcaaggcta gacgggactt accgaaagaa accatcaatg atggtttctt ttttgttcat   4920

aaatcagaca aaacttttct cttgcaaaag tttgtgaagt gttgcacaat ataaatgtga   4980

aatacttcac aaacaaaaag acatcaaaga gaaacatacc ctgcaaggat gctgatattg   5040

tctgcatttg cgccggagca aaccaaaaac ctggtgagac acgccttgaa ttagtagaaa   5100

agaacttgaa gattttcaaa ggcatcgtta gtgaagtcat ggcgagcgga tttgacggca   5160

ttttcttagt cggtaacaat cctcgttaaa ggacaaggac ctgagcggaa gtgtatcgta   5220

cagtagacgg agtatactag tatagtctat agtccgtgga attattatat ttatctccga   5280

cgatattctc atcagtgaaa tccagctgga gtcctctagc aaattttttt attagctgaa   5340

cttagtatta gtggggccgc tgataattac taatactagg agaagttaat aaatacgtaa   5400

ccaacatgat taacaattat tagaggtcat cgttcaaaat ggtatgcgtt ttgacacatc   5460

cactatatat ccgtgtcgtt ctgtccactc ctgaatccca ttccagaaat tctctagcga   5520

ttccagaagt ttctcagagt cggaaagttg accagacatt acgaactggc acagatggtc   5580

ataacctgaa ggaagatctg attgcttaac tgcttcagtt aagaccgaag cgctcgtcgt   5640

ataacagatg cgatgatgca gaccaatcaa catggcacct gccattgcta cctgtacagt   5700
```

```
caaggatggt agaaatgttg tcggtccttg cacacgaata ttacgccatt tgcctgcata    5760

ttcaaacagc tcttctacga taagggcaca aatcgcatcg tggaacgttt gggcttctac    5820

cgatttagca gtttgataca ctttctctaa gtatccacct gaatcataaa tcggcaaaat    5880

agagaaaaat tgaccatgtg taagcggcca atctgattcc acctgagatg cataatctag    5940

tagaatctct tcgctatcaa aattcacttc caccttccac tcaccggttg tccattcatg    6000

gctgaactct gcttcctctg ttgacatgac acacatcatc tcaatatccg aatagggccc    6060

atcagtctga cgaccaagag agccataaac accaatagcc ttaacatcat ccccatattt    6120

atccaatatt cgttccttaa tttcatgaac aatcttcatt ctttcttctc tagtcattat    6180

tattggtcca ttcactattc tcattccctt ttcagataat tttagatttg cttttctaaa    6240

taagaatatt tggagagcac cgttcttatt cagctattaa taactcgtct tcctaagcat    6300

catggtctca cttttccact ttttgtcttg tccactaaaa cccttgattt ttcatctgaa    6360

taaatgctac tattaggaca cataatatta aaagaaaccc ccatctattt agttatttgt    6420

ttagtcactt ataactttaa cagatggggt ttttctgtgc aaccaatttt aagggttttc    6480

aatactttaa aacacataca taccaacact tcaacgcacc tttcagcaac taaaataaaa    6540

atgacgttat ttctatatgt atcaagataa gaaagaacaa gttcaaaacc atcaaaaaaa    6600

gacacctttt caggtgcttt ttttatttta taaactcatt ccctgatctc cccatactcc    6660

tccaatccaa agctatttag aaagattact atatcctcaa acaggcggta accggcctct    6720

tcatcgggaa tgcgcgcgac cttcagcatc gccggcatgt ccccctggcg gacgggaagt    6780

atccagctcg aggtcgggcc gcgttgctgg cgttttttcca taggctccgc cccctgacg    6840

agcatcacaa aaatcgacgc tcaagtcaga ggtggcgaaa cccgacagga ctataaagat    6900

accaggcgtt tccccctgga agctccctcg tgcgctctcc tgttccgacc ctgccgctta    6960

ccggatacct gtccgccttt ctcccttcgg gaagcgtggc gctttctcat agctcacgct    7020

gtaggtatct cagttcggtg taggtcgttc gctccaagct gggctgtgtg cacgaacccc    7080

ccgttcagcc cgaccgctgc gccttatccg gtaactatcg tcttgagtcc aacccggtaa    7140

gacacgactt atcgccactg gcagcagcca ctggtaacag gattagcaga gcgaggtatg    7200

taggcggtgc tacagagttc ttgaagtggt ggcctaacta cggctacact agaaggacag    7260

tatttggtat ctgcgctctg ctgaagccag ttaccttcgg aaaaagagtt ggtagctctt    7320

gatccggcaa acaaaccacc gctggtagcg gtggtttttt tgtttgcaag cagcagatta    7380

cgcgcagaaa aaaggatct caagaagatc ctttgatctt ttctacgggg tctgacgctc    7440

agtggaacga aaactcacgt taagggattt tggtcatgag attatcaaaa aggatcttca    7500
```

6

```
cctagatcct tttaaattaa aaatgaagtt ttaaatcaat ctaaagtata tatgagtaaa    7560

cttggtctga cagttaccaa tgcttaatca gtgaggcacc tatctcagcg atctgtctat    7620

ttcgttcatc catagttgcc tgactccccg tcgtgtagat aactacgata cgggagggct    7680

taccatctgg ccccagtgct gcaatgatac cgcgagaccc acgctcaccg gctccagatt    7740

tatcagcaat aaaccagcca gccggaaggg ccgagcgcag aagtggtcct gcaactttat    7800

ccgcctccat ccagtctatt aattgttgcc gggaagctag agtaagtagt tcgccagtta    7860

atagtttgcg caacgttgtt gccattgctg caggcatcgt ggtgtcacgc tcgtcgtttg    7920

gtatggcttc attcagctcc ggttcccaac gatcaaggcg agttacatga tcccccatgt    7980

tgtgcaaaaa agcggttagc tccttcggtc ctccgatcgt tgtcagaagt aagttggccg    8040

cagtgttatc actcatggtt atggcagcac tgcataattc tcttactgtc atgccatccg    8100

taagatgctt ttctgtgact ggtgagtact caaccaagtc attctgagaa tagtgtatgc    8160

ggcgaccgag ttgctcttgc ccggcgtcaa cacgggataa taccgcgcca catagcagaa    8220

ctttaaaagt gctcatcatt ggaaaacgtt cttcggggcg aaaactctca aggatcttac    8280

cgctgttgag atccagttcg atgtaaccca ctcgtgcacc caactgatct tcagcatctt    8340

ttactttcac cagcgtttct gggtgagcaa aaacaggaag gcaaaatgcc gcaaaaaagg    8400

gaataagggc gacacggaaa tgttgaatac tcatactctt cctttttcaa tattattgaa    8460

gcatttatca gggttattgt ctcatgagcg gatacatatt tgaatgtatt tagaaaaata    8520

aacaaatagg ggttccgcgc acatttcccc gaaaagtgcc acctgacgtc taagaaacca    8580

ttattatcat gacattaacc tataaaaata ggcgtatcac gaggcccttt cgtcttcaag    8640

aatt                                                                 8644
```

```
<210>   4
<211>   91
<212>   DNA
<213>   Artificial sequence

<220>
<223>   Primer p920mrgaF2

<400>   4
ctgaggccaa ttaggccaag tttattcttg acattaggga acatgcatga tataataggt    60

aaagtaaaca gatcacaagg aggacgttat c                                   91


<210>   5
<211>   34
<212>   DNA
<213>   Artificial sequence

<220>
```

<223> Primer MBmrgaR2

<400> 5
tgaaggatcc acgcgtccag cagacagaaa gcag   34

<210> 6
<211> 49
<212> DNA
<213> Artificial sequence

<220>
<223> Promoter P920

<400> 6
aagtttattc ttgacattag ggaacatgca tgatataata ggtaaagta   49

<210> 7
<211> 642
<212> DNA
<213> Artificial sequence

<220>
<223> PCR product of promoter 920 and mrgA

<400> 7
ctgaggcctt aagggccaag tttattcttg acattaggga acatgcatga tataataggt   60

aaagtaaaca gatcacaagg aggacgttat cttatgaaaa ctgaaaacgc aaaaacaaat   120

caaacattag ttgagaattc actgaacaca caattatcaa actggtttct tttatactct   180

aagctccacc gtttccattg gtatgtgaaa gggcctcatt tctttacatt gcacgagaaa   240

tttgaagaac tttatgacca tgcggctgaa acagtggata ccatcgctga gcgcctgctg   300

gcgattggcg gacagcctgt tgccacagtg aaagaataca ctgagcatgc atctatcaca   360

gacggcggaa acgaaacatc agcatcagaa atggtacaag cattggtaaa cgactacaaa   420

caaatcagca gcgaatctaa attcgtgatc ggcctggctg aagaaaatca agacaatgcg   480

acagcggact tgtttgtcgg attaattgaa gaagttgaaa aacaagtgtg gatgctttcc   540

tcttatttag ggtaacaaaa aagctgaacc ttaatcgggt tcagcttttt gttttttctt   600

agcttgaact gctttctgtc tgcttgacgc gtggatcctt ca   642

<210> 8
<211> 91
<212> DNA
<213> Artificial sequence

<220>
<223> Primer p740mrgaF2

<400> 8
ctgaggccaa ttaggcccgg aagtttgttg acacagctcc aggatacaaa tataatgggt   60

cgactaaaca gatcacaagg aggacgttat c   91

```
<210>  9
<211>  49
<212>  DNA
<213>  Artificial sequence

<220>
<223>  Promoter P740

<400>  9
cggaagtttg ttgacacagc tccaggatac aaatataatg ggtcgagta               49


<210>  10
<211>  642
<212>  DNA
<213>  Artificial sequence

<220>
<223>  PCR product of promoter 740 and mrgA

<400>  10
ctgaggcctt aagggcccgg aagtttgttg acacagctcc aggatacaaa tataatgggt    60

cgagtaaaca gatcacaagg aggacgttat cttatgaaaa ctgaaaacgc aaaaacaaat   120

caaacattag ttgagaattc actgaacaca caattatcaa actggtttct tttatactct   180

aagctccacc gtttccattg gtatgtgaaa gggcctcatt tctttacatt gcacgagaaa   240

tttgaagaac tttatgacca tgcggctgaa acagtggata ccatcgctga gcgcctgctg   300

gcgattggcg gacagcctgt tgccacagtg aaagaataca ctgagcatgc atctatcaca   360

gacggcggaa acgaaacatc agcatcagaa atggtacaag cattggtaaa cgactacaaa   420

caaatcagca gcgaatctaa attcgtgatc ggcctggctg aagaaatca  agacaatgcg   480

acagcggact tgtttgtcgg attaattgaa gaagttgaaa acaagtgtg  gatgctttcc   540

tcttatttag ggtaacaaaa aagctgaacc ttaatcgggt tcagctttt  gtttttctt   600

agcttgaact gctttctgtc tgcttgacgc gtggatcctt ca                     642


<210>  11
<211>  91
<212>  DNA
<213>  Artificial sequence

<220>
<223>  Primer p726mrgaF2

<400>  11
ctgaggccaa ttaggccgag gtgagatttg acactagtag gctacgggac tataatgcgg    60

gaagtaaaca gatcacaagg aggacgttat c                                  91
```

9

```
<210>  12
<211>  49
<212>  DNA
<213>  Artificial sequence

<220>
<223>  Promoter P726

<400>  12
gaggtgagat ttgacactag taggctacgg gactataatg cgggaagta                    49


<210>  13
<211>  642
<212>  DNA
<213>  Artificial sequence

<220>
<223>  PCR product of promoter P726 and mrgA

<400>  13
ctgaggcctt aagggccgag gtgagatttg acactagtag gctacgggac tataatgcgg        60

gaagtaaaca gatcacaagg aggacgttat cttatgaaaa ctgaaaacgc aaaaacaaat       120

caaacattag ttgagaattc actgaacaca caattatcaa actggtttct tttatactct       180

aagctccacc gtttccattg gtatgtgaaa gggcctcatt tctttacatt gcacgagaaa       240

tttgaagaac tttatgacca tgcggctgaa acagtggata ccatcgctga gcgcctgctg       300

gcgattggcg gacagcctgt tgccacagtg aaagaataca ctgagcatgc atctatcaca       360

gacggcggaa acgaaacatc agcatcagaa atggtacaag cattggtaaa cgactacaaa       420

caaatcagca gcgaatctaa attcgtgatc ggcctggctg aagaaatca agacaatgcg        480

acagcggact tgtttgtcgg attaattgaa gaagttgaaa aacaagtgtg gatgctttcc       540

tcttatttag ggtaacaaaa aagctgaacc ttaatcgggt tcagcttttt gttttttctt       600

agcttgaact gctttctgtc tgcttgacgc gtggatcctt ca                         642


<210>  14
<211>  88
<212>  DNA
<213>  Artificial sequence

<220>
<223>  Primer AN162

<400>  14
agactgtccg cggtgtaaaa aataggaata aaggggggtt gacattattt tactgatatg        60
tataatataa tttgtataag aaaatgag                                           88


<210>  15
<211>  32
<212>  DNA
<213>  Artificial sequence
```

10

```
<220>
<223>  Primer AN163c

<400>  15
gcatacacgc gttgtcacac ctgatgccga cc                                   32


<210>  16
<211>  8152
<212>  DNA
<213>  Artificial sequence

<220>
<223>  Plasmid pAN213ban

<400>  16
ccgcggtgta aaaaatagga ataaaggggg gttgacatta ttttactgat atgtataata    60
taatttgtat aagaaaatga gagggagagg aaacatgatt caaaaacgaa agcggacagt   120
ttcgttcaga cttgtgctta tgtgcacgct gttatttgtc agtttgccga ttacaaaaac   180
atcagccgta aatggcacgc tgatgcagta ttttgaatgg tatacgccga acgacggcca   240
gcattggaaa cgattgcaga atgatgcgga acatttatcg gatatcggaa tcactgccgt   300
ctggattcct cccgcataca aaggattgag ccaatccgat aacggatacg gaccttatga   360
tttgtatgat ttaggagaat tccagcaaaa agggacggtc agaacgaaat acggcacaaa   420
atcagagctt caagatgcga tcggctcact gcattcccgg aacgtccaag tatacggaga   480
tgtggttttg aatcataagg ctggtgctga tgcaacagaa gatgtaactg ccgtcgaagt   540
caatccggcc aatagaaatc aggaaacttc ggaggaatat caaatcaaag cgtggacgga   600
ttttcgtttt ccgggccgtg aaacacgta cagtgatttt aaatggcatt ggtatcattt    660
cgacggagcg gactgggatg aatcccggaa gatcagccgc atctttaagt ttcgtgggga   720
aggaaaagcg tgggattggg aagtatcaag tgaaaacggc aactatgact atttaatgta   780
tgctgatgtt gactacgacc accctgatgt cgtggcagag acaaaaaaat ggggtatctg   840
gtatgcgaat gaactgtcat tagacggctt ccgtattgat gccgccaaac atattaaatt   900
ttcatttctg cgtgattggg ttcaggcggt cagacaggcg acgggaaaag aaatgtttac   960
ggttgcggag tattggcaga ataatgccgg gaaactcgaa aactacttga ataaaacaag  1020
ctttaatcaa tccgtgtttg atgttccgct tcatttcaat ttacaggcgg cttcctcaca  1080
aggaggcgga tatgatatga ggcgtttgct ggacggtacc gttgtgtcca ggcatccgga  1140
aaaggcggtt acatttgttg aaaatcatga cacacagccg ggacagtcat tggaatcgac  1200
agtccaaact tggtttaaac cgcttgcata cgcctttatt ttgacaagag aatccggtta  1260
tcctcaggtg ttctatgggg atatgtacgg gacaaaaggg acatcgccaa aggaaattcc  1320
ctcactgaaa gataatatag agccgatttt aaaagcgcgt aaggagtacg catacgggcc  1380
ccagcacgat tatattgacc acccggatgt gatcggatgg acgagggaag gtgacagctc  1440
cgccgccaaa tcaggtttgg ccgctttaat cacggacgga cccggcggat caaagcggat  1500
gtatgccggc ctgaaaaatg ccggcgagac atggtatgac ataacgggca accgttcaga  1560
tactgtaaaa atcggatctg acggctgggg agagtttcat gtaaacgatg ggtccgtctc  1620
catttatgtt cagaaataag gtaataaaaa aacacctcca agctgagtgc gggtatcagc  1680
ttggaggtgc gtttattttt tcagccgtat gacaaggtcg gcatcaggtg tgacaacgcg  1740
tgatccagac cagttccctg agcttccgtc agtcggatcc cattgcggaa aatagtcata  1800
ggcatcctgg aattcaatgt tgcgaataat gacgttatca ctcttgattt ggaagtttcc  1860
tcccacgact ttagcgttag tccctgaacc gacgatcgtc gtgttgcag ggatatccac   1920
catgacccgt gcttttggt ttttctgaga gcgtgctctc gcttcttctt gtgttcccga   1980
cggctctttt ttgccccatg tgctaggatc ataggctttc aaatatttgt ccaaatcata  2040
ctccggatct ttatagtcat ttaggccaag cggcttcaga ttgtcatcca cgttcatgtc  2100
aatcgttccc ttgatataaa tgatttttgg cgttgtgttc gtttccttcc ctaatgccga  2160
gacaagctgg tttctgttgc tgacggtata cacatttgag gaggatgctt ttgatccgcc  2220
tgtcgtgccg gtcgagtacg cgccccagcc atcattggat cccaacgtct ggtggcctaa  2280
atcagctgcg ttcgcgccag ctggagtcaa tcctaaaaac aaagccgtag ctaacatcaa  2340
aagggcctcg tgatacgcct atttttatag gttaatgtca tgataataat ggtttcttag  2400
acgtcaggtg gcacttttcg gggaaatgtg cgcggaaccc ctatttgttt atttttctaa  2460
atacattcaa atatgtatcc gctcatgaga caataaccct gataaatgct tcaataatat  2520
tgaaaaagga agagtatgag tattcaacat ttccgtgtcg cccttattcc cttttttgcg  2580
gcatttgcc ttcctgtttt tgctcaccca gaaacgctgg tgaaagtaaa agatgctgaa   2640
```

```
gatcagttgg gtgcacgagt gggttacatc gaactggatc tcaacagcgg taagatcctt   2700
gagagttttc gccccgaaga acgttttcca atgatgagca cttttaaagt tctgctatgt   2760
ggcgcggtat tatcccgtgt tgacgccggg caagagcaac tcggtcgccg catacactat   2820
tctcagaatg acttggttga gtactcacca gtcacagaaa agcatcttac ggatggcatg   2880
acagtaagag aattatgcag tgctgccata accatgagtg ataacactgc ggccaactta   2940
cttctgacaa cgatcggagg accgaaggag ctaaccgctt ttttgcacaa catggggggat   3000
catgtaactc gccttgatcg ttgggaaccg gagctgaatg aagccatacc aaacgacgag   3060
cgtgacacca cgatgcctgc agcaatggca acaacgttgc gcaaactatt aactggcgaa   3120
ctacttactc tagcttcccg gcaacaatta atagactgga tggaggcgga taaagttgca   3180
ggaccacttc tgcgctcggc ccttccggct ggctggttta ttgctgataa atctggagcc   3240
ggtgagcgtg ggtctcgcgg tatcattgca gcactggggc cagatggtaa gccctcccgt   3300
atcgtagtta tctacgacgg ggagtcag gcaactatgg atgaacgaaa tagacagatc   3360
gctgagatag gtgcctcact gattaagcat tggtaactgt cagaccaagt ttactcatat   3420
atactttaga ttgatttaaa acttcatttt taatttaaaa ggatctaggt gaagatcctt   3480
tttgataatc tcatgaccaa aatcccttaa cgtgagtttt cgttccactg agcgtcagac   3540
cccgtagaaa agatcaaagg atcttcttga gatccttttt ttctgcgcgt aatctgctgc   3600
ttgcaaacaa aaaaaccacc gctaccagcg gtggtttgtt tgccggatca agagctacca   3660
actctttttc cgaaggtaac tggcttcagc agagcgcaga taccaaatac tgtccttcta   3720
gtgtagccgt agttaggcca ccacttcaag aactctgtag caccgcctac atacctcgct   3780
ctgctaatcc tgttaccagt ggctgctgcc agtggcgata agtcgtgtct taccgggttg   3840
gactcaagac gatagttacc ggataaggcg cagcggtcgg gctgaacggg gggttcgtgc   3900
acacagccca gcttggagcg aacgacctac accgaactga gatacctaca gcgtgagcta   3960
tgagaaagcg ccacgcttcc cgaagggaga aaggcggaca ggtatccggt aagcggcagg   4020
gtcggaacag gagagcgcac gagggagctt ccagggggaa acgcctggta tctttatagt   4080
cctgtcgggt ttcgccacct ctgacttgag cgtcgatttt tgtgatgctc gtcaggggggg   4140
cggagcctat ggaaaaacgc cagcaacgcg gcccgacctc gagctggata cttcccgtcc   4200
gccagggggga catgccggcg atgctgaagg tcgcgcgcat tcccgatgaa gaggccggtt   4260
accgcctgtt tgaggatata gtaatctttc taaatagctt tggattggag gagtatgggg   4320
agatcaggga atgagtttat aaaataaaaa aagcacctga aaaggtgtct ttttttgatg   4380
gttttgaact tgttctttct tatcttgata catatagaaa taacgtcatt tttatttag   4440
ttgctgaaag gtgcgttgaa gtgttggtat gtatgtgttt taaagtattg aaaacccttaa   4500
aaattggttg cacagaaaaa ccccatctgt taaagttata agtgactaaa caaataacta   4560
aatagatggg ggtttctttt aatattatgt gtcctaatag tagcatttat tcagatgaaa   4620
aatcaaggg tttagtggac aagacaaaaa gtggaaaagt gagaccatga tgcttaggaa   4680
gacgagttat taatagctga ataagaacgg tgctctccaa atattcttat ttagaaaagc   4740
aaatctaaaa ttatctgaaa agggaatgag aatagtgaat ggaccaataa taatgactag   4800
agaagaaaga atgaagattg ttcatgaaat taaggaacga atattggata aatatggggga   4860
tgatgttaag gctattggtg tttatggctc tcttggtcgt cagactgatg ggccctattc   4920
ggatattgag atgatgtgtg tcatgtcaac agaggaagca gagttcagcc atgaatggac   4980
aaccggtgag tggaaggtgg aagtgaattt tgatagcgaa gagattctac tagattatgc   5040
atctcaggtg gaatcagatt ggccgcttac acatggtcaa tttttctcta ttttgccgat   5100
ttatgattca ggtggatact tagagaaagt gtatcaaact gctaaatcgg tagaagccca   5160
aacgttccac gatgcgattt gtgcccttat cgtagaagag ctgtttgaat atgcaggcaa   5220
atggcgtaat attcgtgtgc aaggaccgac aacatttcta ccatccttga ctgtacaggt   5280
agcaatggca ggtgccatgt tgattggtct gcatcatcgc atctgttata cgacgagcgc   5340
ttcggtctta actgaagcag ttaagcaatc agatcttcct tcaggttatg accatctgtg   5400
ccagttcgta atgtctggtc aactttccga ctctgagaaa cttctggaat cgctagagaa   5460
tttctggaat gggattcagg agtggacaga acgacacgga tatatagtgg atgtgtcaaa   5520
acgcatacca ttttgaacga tgacctctaa taattgttaa tcatgttggt tacgtatttta   5580
ttaacttctc ctagtattag taattatcag cggccccact aatactaagt tcagctaata   5640
aaaaaatttg ctaaagaact ccagctggat ttcactgatg agaatatcgt cggagataaa   5700
tataataatt ccacggacta tagactatac tagtatactc cgtctactgt acgatacact   5760
tccgctcagg tccttgtcct ttaacgagga ttgttaccga ctaagaaaat gccgtcaaat   5820
ccgctcgcca tgacttcacg tcgacccgca cccgcttgat ttataacatt tgatttcaca   5880
ttagcagaag catcaatcga tccatgcaga gacggcgtcc agccgacaga agagctcagc   5940
ccgtttgcag ccgatgcgtt gatctgtgtg ccgttcagca acgtgccgga gtcatataaa   6000
gccgttcccc cgctgaatac gctgatcgtt ttagcagctg acagtcccgg tacgtcaatg   6060
acattgtttt gggcatagat tttagatgac tttccgattc cccatgcata gctaaaagga   6120
taacttgaag agcttgtgct tccttcataa tagttgttgt atacgtgcac ttgcccgaag   6180
cggactctcg cgcgcgctg dacaatattt ttatagcggt tatgatgcag cgtaattttt   6240
aatttgccgt catcggaggt tttgctgtca cttgatccga aaatggagct tttatcatga   6300
```

12

```
tcgtgataat agttgtagga catcgtgata tagttagcac cgttggaagc atccgtttgg    6360
ccgtcatggt gctgatattt tcttccataa tatttcggtg atgtgctgtc cggacgcgaa    6420
ccgtgtcggc gatataggcg ccagcaaccg cacctgtggc gccggtgatg ccggccacga    6480
tgcgtccggc gtagaggatc tggagctgta atataaaaac cttcttcaac taacggggca    6540
ggttagtgac attagaaaac cgactgtaaa aagtacagtc ggcattatct catattataa    6600
aagccagtca ttaggcctat ctgacaattc ctgaatagag ttcataaaca atcctgcatg    6660
ataaccatca caaacagaat gatgtacctg taaagatagc ggtaaatata ttgaattacc    6720
tttattaatg aattttcctg ctgtaataat gggtagaagg taattactat tattattgat    6780
atttaagtta aacccagtaa atgaagtcca tggttatgtc tttgtatccc gtttgtatta    6840
cttgatcctt taactctggc aaccctcaaa attgaatgag acatgctaca cctccggata    6900
ataaatatat ataaacgtat atagatttca taaagtctaa cacactagac ttatttactt    6960
cgtaattaag tcgttaaacc gtgtgctcta cgaccaaaac tataaaacct ttaagaactt    7020
tcttttttta caagaaaaaa gaaattagat aaatctctca tatcttttat tcaataatcg    7080
catccgattg cagtataaat ttaacgatca ctcatcatgt tcatatttat cagagctcgt    7140
gctataatta tactaatttt ataaggagga aaaaatatgg gcatttttag tatttttgta    7200
atcagcacag ttcattatca accaaacaaa aaataagtgg ttataatgaa tcgttaataa    7260
gcaaaattca tataaccaaa ttaaagaggg ttataatgaa cgagaaaaat ataaaacaca    7320
gtcaaaactt tattacttca aaacataata tagataaaat aatgacaaat ataagattaa    7380
atgaacatga taatatcttt gaaatcggct caggaaaagg ccattttacc cttgaattag    7440
taaagaggtg taatttcgta actgccattg aaatagacca taaattatgc aaaactacag    7500
aaaataaact tgttgatcac gataatttcc aagtttaaa caaggatata ttgcagttta    7560
aatttcctaa aaaccaatcc tataaaatat atggtaatat accttataac ataagtacgg    7620
atataatacg caaaattgtt tttgatagta tagctaatga gatttatttta atcgtggaat    7680
acgggtttgc taaaagatta ttaaatacaa aacgctcatt ggcattactt ttaatggcag    7740
aagttgatat ttctatatta agtatggttc caagagaata ttttcatcct aaacctaaag    7800
tgaatagctc acttatcaga ttaagtagaa aaaaatcaag aatatcacac aaagataaac    7860
aaaagtataa ttatttcgtt atgaaatggg ttaacaaaga atacaagaaa atatttacaa    7920
aaaatcaatt taacaattcc ttaaaacatg caggaattga cgatttaaac aatattagct    7980
ttgaacaatt cttatctctt ttcaatagct ataaattatt taataagtaa gttaagggat    8040
gcataaactg catcccttaa cttgtttttc gtgtgcctat tttttgtgaa tcgacctgca    8100
ggcatgcaag cttttttcaat tcatccgtca cagtctcagg atgattgatc ac           8152
```